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A Real Time Face Attendance Using Deep Learning

Farooque Alam
Department of Computer Science, Delhi Global Institute of Technology, Haryana, India

Abstract: ***One area of biometry technologies which is expanding quickly and being used extensively is face attendance in real time.Its uses are finding solutions for the industry, institutions, and law departments.The development of deep neural networks i ntended for all sets offace identification tasks, from recognition and preprocessing to image presentation and classification in ve rifying and finding answers, has become the primary focus of research due to the recent introduction of powerful, reasonably pri ced GPUs and the growth of massive face databases.The high processing expense of using Deep Convolutions Neural Networks (DCNN) and the need to strike a compromise between accuracy requirements and time and resource restrictions are the main rea sons why realtime, exact image detection remains difficult despite recent advancements.Other important problems with face reco gnition include posture invariance, light, and occlusion, which significantly reduce accuracy in both deep neural networks and c onventional handmade methods.It highlights areas that need further growth and improvement and offers a thorough analysis of both deep and shallow solutions .Inaddition to providing end users in business, government, and consumer with an insightful an d critical viewpoint on currently available solutions, this review aims to support scientists' and engineers' research into new appr oaches of existing methodologies.***

Keywords: Biometry, image detection, face identification, , face verification, face alignment.

I. INTRODUCTION

Conventional techniques for image identification heavily depended on manually extracted characters and statistical methods, which often faced problems due to changes in brightening, angles, image gestures, and obstructions. Recently, the rise of deep learning has effectivelchanged the performance and dependability of photo identification applications. Deep learning, specifically through convolutional neural networks (CNNs), allows for the automatic acquisition of high-level features straight from raw images. [2]Sontakke, S., Sonawane, T., Suryawanshi, K., Gondaliya, B., and Satpute, R. (2020).OpenCV was used in their work.
The application was made with Python.On the other hand, the Raspberry Pi acts as the processing unit for the application.
The Raspberry Pi has both the camera and the open CV installed.The student is repeatedly photographed in front of the camera to ge nerate the face database.About 100 distinct photos of every pupil are used to generate the face database.
As a result of saving all of these pictures, a face database is produced.By comparing a collection of distinct Haarlike features, face d etection on a human face is achieved.The Local Binary Patterns Histogram (LBPH) technique was employed in this study to recogni ze faces.This approach, grounded in data, has led to relevant advancements in face detection, alignment, and photo identification, achieving performance levels close to human accuracy in many tests. Notable models such as DeepFace, FaceNet, and ArcFace have proven the capability of deep learning in capturing intricate facial characteristics across various settings. The incorporation of deep neural networks intoimage identification has facilitated a broad spectrum of practical uses, ranging upto smartphone applications. [3] Ranjan, R., C. D. Castillo, and R. Chellappa, *L2-constrained Softmax Loss for Discriminative Face Verification.* 2017.used Softmax loss regularized with a scaled L2 Norm constraint which was shown to optimize the angular margin between classes. The last stage occurs after training. In which conversion of test images to deep representations, similarity is calculated by use of L2 distance or cosine distance, after which methods such as nearest neighbor or threshold comparison are used to identify or verify faces. Other methods, including metric learning and sparse representation classifiers are use to post-process deep features. It must however be noted that despite the high exactness produced using these novel loss functions, they suffer excessive GPU memory consumption within the classification layer when handling large amounts of data. Additionally, the triplet and contrastive loss functions are disadvantaged by the difficult task of selecting effective training samples.

II. RELATED WORKS

In the Paper .[6] "Face Recognition Based Attendance System" authored by Nandhini R. , the writer states that the basic operational principle of the project is that the recorded video data is converted into images for identification and recognition.
A CNN (Convolution Neural Network) algorithm is employed to detect the faces. A CNN, which resembles a multilayer perceptron, is designed to process the requirements more efficiently. Following the identification and training of the face,

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it is compared to the images stored in the student database to update the attendance records of the students. The post-processing phase entails the process of recording the names of the students into an Excel sheet. These Excel sheets may be maintained on a weekly or monthly basis to track the attendance of the students.

Baig et al. (2022)[1] created a safe and efficient facial recognition method for personal verification.

Images from an Android phone's single camera were taken in this study utilizing Open CV, and they were then passed to a Convolut ional Neural Network (CNN) for facial recognition processing.An Excel sheet was used to record the attendance.

Although students may not be physically present in the classroom, they can still check in to the facial recognition server and have th eir attendance recorded using this private method, which will only record and account for one student.Face recognition is a biometric method of identifying an individual by comparing images captured at real-time with the images stored in the database[5] (Margaret Rouse, 2012). We may not realize the numerous steps our brains take in recognizing human faces and objects in our surroundings, but our eyes assist the brain in performing various processes every day, as recognizing faces is crucial for human existence. Many choices we make are based on our perceptions, with our eyes playing a central role in that process..

III. METHODOLOGY

The sliding camera architecture put out by [4]Essien, U., & Ansa, G. (2023) is used in the suggested system.

Regardless of the size of the class, this camera system can capture class images, and its capacity to segment images for distinct class es makes it useful for capturing class images for the face identification stage of this face recognition system.

The face detection module receives the class photos and uses them to identify and crop the faces of the participants.

Using distinct random numbers in their file names, each recognized face is individually identified.

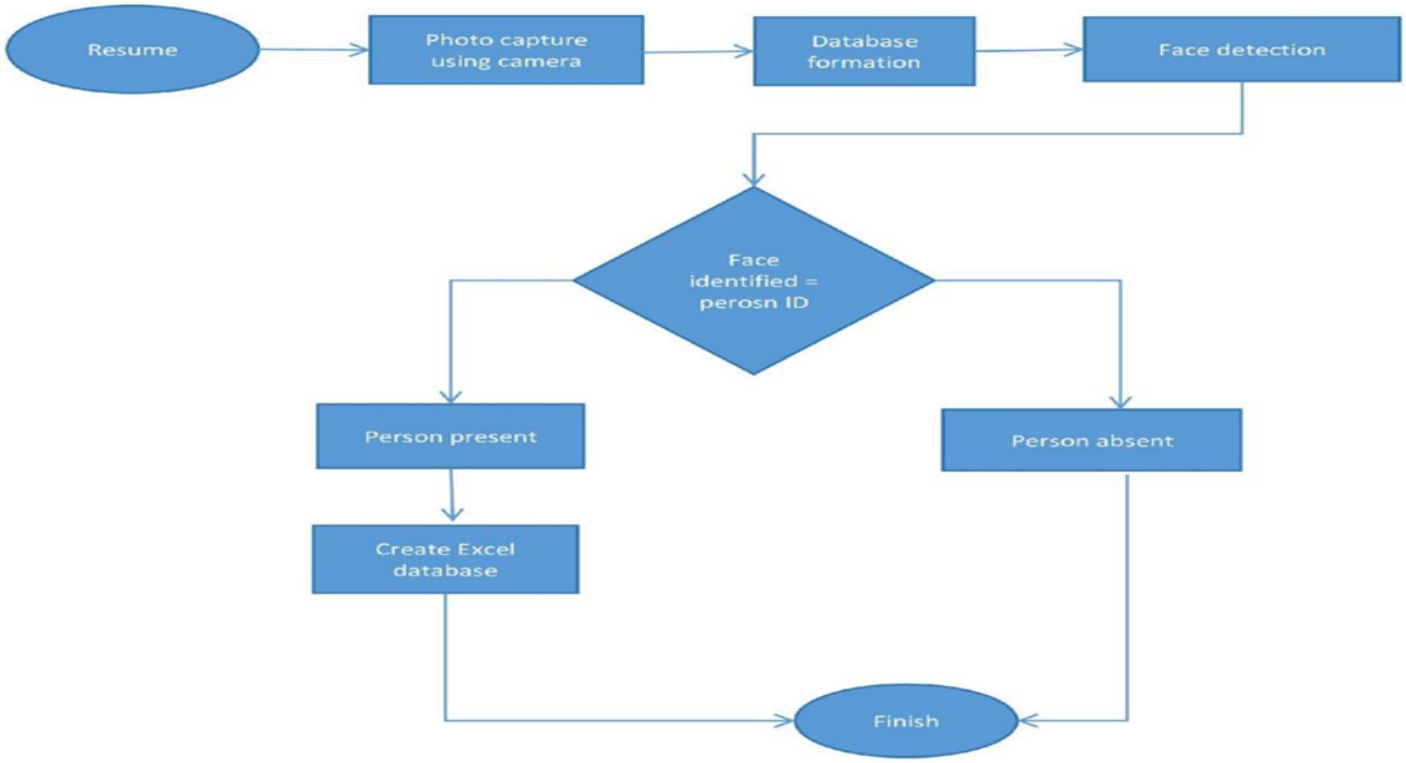
Instruction 1: Examine the path to the face database folder.

Instruction 2: Determine whether images are present in the folder path; if so, generate an extracted embeddings array.

Instruction 3: For every picture in the folder, identifyo. Use the Deepface framework and the FaceNet-
512 model as embeddings to extract facial features from the image.

With image path as the key and embeddings as the value, push embeddings to the extracted embeddings array that was produced in i nstruction 2.

Instruction4: Use the pickle library to serialize the extracted embedding object, then save the file with the name representations_feat ure_extraction_method.pkl within the face database folder.



IV. CONCLUSION

Unauthorized users cannot alter the attendance records or report since access to them is secure.Externally authenticated users who m ight need to create policies based on the data stored in the system's database can access the webbased API.The autonomy module an d visual perception are discussed in this study.

It then goes on to describe the project's technologies and methodologies. .Even when subjects had a beard or other facial traits, or w ore glasses, Haar-Cascades face detection performed incredibly well.

The speed of the realtime video was adequate and there was no discernible frame lag.When all things are taken into account, LBPH and HaarCascades can be used as an affordable face recognition system.One example is a device that may automatically take attend ance in class or identify known troublemakers in a store or mall and tell the owner to keep him vigilant.

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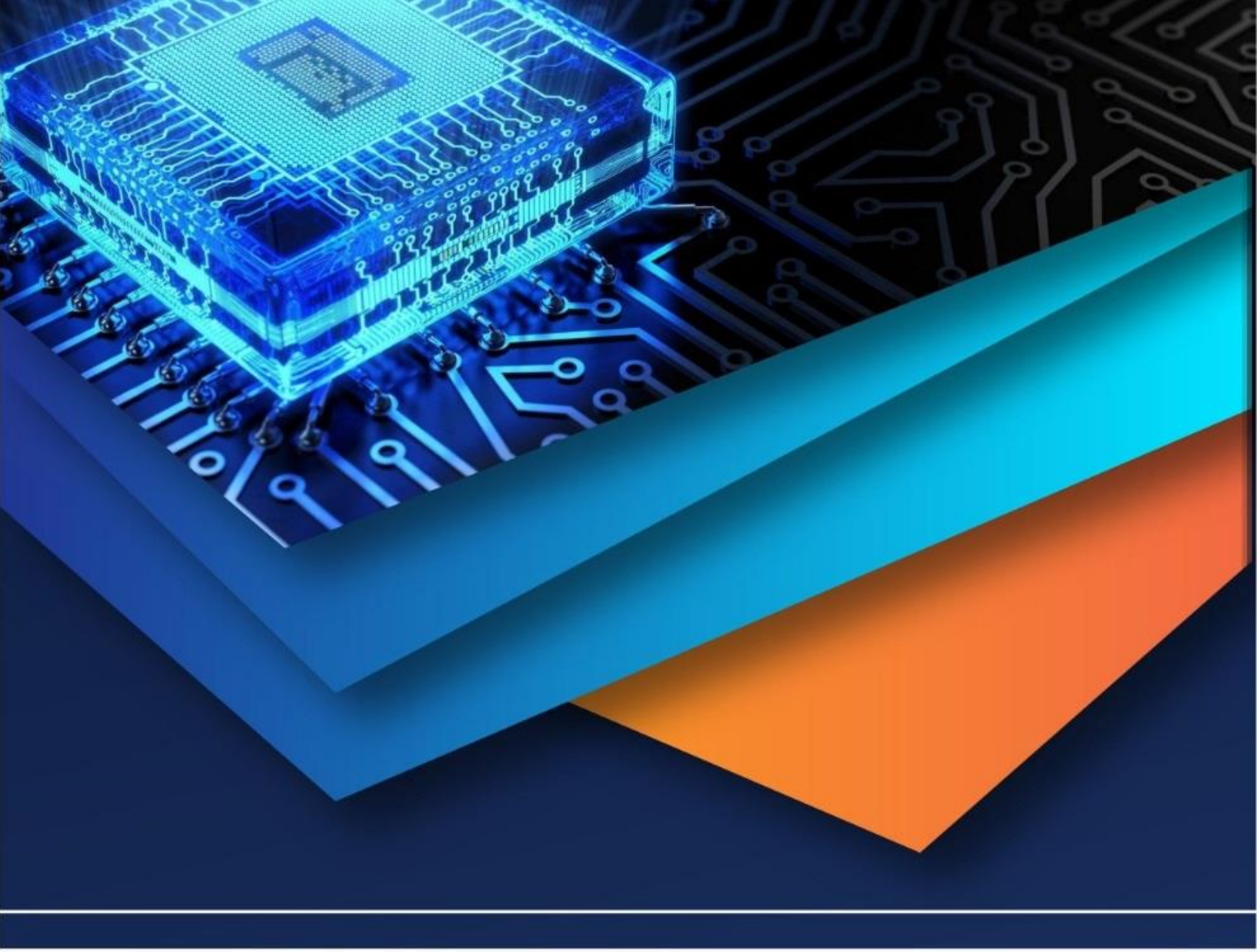
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